Testimony of:

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To:

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Mr. Chairman and Members of the Subcommittee, I very much appreciate the opportunity to testify before you this morning. My name is Valerie Nelson, and I represent the Coalition for Alternative Wastewater Treatment, which is a national network of experts and advocates for alternatives to conventional methods of water and wastewater collection and treatment.

The Coalition would like to join in support of higher levels of federal assistance in meeting the looming "gap" in spending to repair America's aging water and wastewater infrastructure. I would like to introduce this morning, however, a quite different question: how can the limited federal share of overall spending be better used to prod the nation's water and wastewater sector into higher performance at less cost?

Currently, the federal share of capital investment by water and wastewater utilities each year is only about ten percent of total spending, and of this about half, or five percent, flows through the Environmental Protection Agency in SRF authorizations or grants, with the other 5% covered by USDA, HUD, and other agencies. Even calls for a doubling or tripling of EPA funding levels through higher appropriations for the SRF or a new Trust Fund would still leave the federal government as a minor player in what is essentially a local ratepayer service.

What if a $2 billion EPA appropriation each year for grants or loans were used to leverage greater efficiencies and reform, and not just to subsidize local requests for assistance? Various reports have suggested that with better management and planning throughout the sector, 15 to 20% savings in the projected total water and wastewater spending in the US could be achieved.[i] Increased environmental and public health protection could also be achieved with better methods of managing risks and with use of innovative technologies and designs. If the federal share of financing could leverage even ten percent, or about $8 billion savings on a projected $80 billion in yearly capital and operation and maintenance expenditures, that would clearly be a worthy federal investment with a very high rate of return.[ii]

Therefore, I would like to talk this morning about major ways that the U.S. water and wastewater sector needs to be pushed to achieve greater efficiencies and innovation and then to offer some specific suggestions for how federal financing legislation could create the appropriate "carrots" and "sticks" for such reform.

Background:

The current crisis in water and wastewater infrastructure has been defined since the issuance of the 2000 Water Infrastructure Network report, "Clean and Safe Water for the 21st Century", and the subsequent 2001 American Water Works Association report, "Reinvesting in Drinking Water Infrastructure: Dawn of the Replacement Era", as largely a question of where the money can be found to repair and replace the aging infrastructure of water and sewer piping and treatment plants. Most of the underground piping system, which constitutes about 70% of the investment, is decades old, and was installed when sewer and water lines in cities created major advances in sanitation and public health protection, and established American infrastructure as the technology "gold standard" for the rest of the world.

The current problem is not just that this infrastructure is aging, but that the basic technology paradigm of large-scale piping and treatment plant centralization is looking less and less sustainable. Not only is it hugely expensive for communities to maintain the underground infrastructure, but these vast networks of pipes also can create massive disruptions of water supplies and natural hydrologies, and may be doing more damage to ecosystems than anticipated in earlier times. New pollutants, such as endocrine disrupters and pharmaceuticals, will also be an increasing challenge for central treatment plants, as will homeland security issues. There are better and cheaper methods, largely through more localized treatment and reuse, but these need to be strategically incorporated into the existing infrastructure over time, as discussed more below.

I have been privileged in recent months to travel to international water conferences and, prior to this testimony I have also made it a point to speak to a number of international experts in water resource infrastructure. Clearly, a new picture of America's declining role in the world of drinking water and sanitation is emerging. First, the U.S. has become a net importer of innovative water and wastewater technologies and approaches; very little R&D is occurring in either the public or private sectors in the U.S. Further, America's policymakers and practitioners are largely unaware of the intensity and speed of innovation in other countries, and few have moved to adopt the kinds of regulatory, management or technology reforms that are emerging overseas.

I suggest that this loss of American leadership in water and sanitation relative to the rest of the world is a problem that eclipses the "gap", because it means both that the U.S. sector is headed to relatively greater inefficiencies over time, and secondarily, that the jobs and export income from high-tech water resource technologies and methods are being generated outside the US. For example, Japan is now reaping the benefits from government investment in membrane technologies in the 1980's, and the European Union is currently investing heavily in research into innovative collection systems and source separation technologies, with the expectation that there will be huge markets both in Europe and in developing nations with growing middle class neighborhoods, such as China and India.[iii]

Many US utilities are fairly adept at incorporating new treatment systems from overseas, as in the local Blue Plains treatment plant recently purchasing innovative equipment from a European company. But, few utilities are taking the long-term (60-year) strategic examination of the future of their service levels and infrastructure approaches that has been forced upon utilities in other countries.[iv] It has been long believed that the US has the wealth and low interest rates to afford such gross inefficiencies, but the funding "gap" discussion is reminding us that we are unlikely to be able to afford such waste in the future.

Numerous reports in the last twenty years have recommended a resumption of federal funding of research and demonstration projects in water and wastewater.[v] The 1972 Clean Water Act had authorized $100 million per year in R&D, and throughout the 1970's about $20 million per year (over $60 million in current dollars) of federal funding was plowed into research on innovative technologies. The federal grants program also provided for an additional subsidy of up to 15% when a utility installed an "Innovative or Alternative" technology. But these efforts by the federal government were phased out by the early 1990's, and other than a modest small business (SBIR) program or occasional funding for special technologies, such as for arsenic removal, the U.S. EPA to all intents and purposes has no technology research and development program to support water resource-related work in universities, research institutes, or in the private sector. Most of the agency's research budget goes to monitoring or environmental and health effects studies and to meeting the short-term research needs of its own regulatory programs, not to far-reaching exploration of sustainable technology innovations and reform.

The Congressional Budget Office was alert to this problem three years ago when it responded to your Committee's questions with a recommendation that a renewed federal role in water and wastewater R&D and dissemination projects was appropriate. Indeed, the CBO report stated that R&D was only one of two classic justifications for federal investment in the sector, the second being subsidies to keep rates affordable for particularly hard-hit communities. CBO also sharply questioned whether unrestricted subsidies to local communities were appropriate, given the tendency of cities to overinvest in technology and to shift their own monies to other city services once they had a federal subsidy in hand.

Perhaps there has been little attention to the CBO report recommendations, because generic recommendations for an expanded federal role in research lack a natural constituency and can't compete against more immediate calls to the Congress to address the looming funding "gap". But the need for the U.S. water and wastewater sector to start a long-term, and in many ways a wrenching, drive to more sustainability is ever more clear as the pace of reform quickens overseas.

I would like to describe three major areas where the U.S. water/wastewater sector has been slow to adopt reforms and is rapidly losing its stature as a leader in technologies and practices: asset management; distributed and nonstructural technologies; and integrated water resource planning and technologies, such as wastewater reuse.

Asset management:

Asset management for infrastructure, which was developed for the water sector in the UK twenty-five years ago and subsequently refined in Australia and New Zealand over the last fifteen years, is an approach that involves a more business-like process of establishing customer service levels and life-cycle management and financing of the assets. Condition assessments, targeting of repairs and replacements on infrastructure constituting greatest risks if they fail, and a better balancing of ongoing maintenance vs. new capital investments are all features in what has been characterized as a massive, top to bottom reorientation in the way the utility operates. Implementation of these methods has been estimated to save upwards of twenty percent in the operational and capital costs of utilities, and asset management is widely used in the electric power industry, transportation, and other sectors in the U.S.

Unfortunately, only a few water and wastewater utilities, such as in Seattle, Washington, and Orange County, California have seriously begun to adopt asset management as a way of doing business. Without asset management, cities all across the country are wasting money on replacing pipes that don't need to be replaced and paying more for emergency repairs of broken pipes that should been receiving cheaper, routine maintenance all along. These breakdowns in equipment are also creating unnecessary threats to public health and the environment. Seattle, for example, has found that they can target resources on such risks as the large sewer pipes near the public hospitals and salmon streams, and have saved millions each year in lowered O&M and capital costs.

Distributed Technologies and Reuse:

In major cities such as Tokyo and Singapore, high-tech membranes are being used to create "zero water emission" buildings involving reuse of wastewater in toilet flushing, landscaping, etc. The old centralization paradigm of piping wastewater miles and miles away from the source was based on the lack of a technology to treat adequately the wastewater at the immediate source, whether the home or office building. But since 70% of the costs of conventional water resource infrastructure is in the underground pipes and not in the treatment plants, technologies that can avoid central collection systems can potentially lead to great cost-savings. A wide range of distributed and nonstructural technologies are becoming available, including point-of-use water treatment for a home or neighborhood, low impact development technologies, wetland restoration, water conservation measures, stormwater retention, and others. Advanced individual home or neighborhood-scale wastewater systems can also be used to replace failing septic systems in outlying areas, instead of constructing costly new trunk sewer lines which promote unplanned new development and runoff.

Integrated Water Resource Planning:

Over time, bureaucracies and utilities developed in separate "siloes" of water, wastewater, stormwater, water supply, and flood control. Many large inefficiencies occur as a result. For example, construction of sewer systems can reduce local groundwater tables and streamflows, which then can lead years later to an expensive search for new water supplies. Countries like Australia have restructured regulations and utilities into "catchments" or watersheds, where water is viewed in an integrated, holistic framework, and these efforts are leading to both cost-savings and environmental improvements.

In the US, the droughts of recent years have led to some awareness of the link between depleted water supplies and the loss of water through big networks of sewer and water pipes and ocean or river outfalls, but the federal government and local agencies have not yet taken the steps to force separate bureaucracies to work on integrated planning.[vi]

There are numerous other examples of reforms being researched and implemented overseas: stormwater retention and reuse in "green roofs" in Germany, in the process not only beautifying the cities but also avoiding expenditures on combined sewer overflows or new water supplies; innovative community collection systems in Brazil; elimination of petroleum use in fertilizers in Sweden by transitioning into reusing domestic sewage sources for nitrogen and phosphorous; and, integration of water/wastewater and energy infrastructure, such as mining sewer lines for heat energy in Vancouver, Canada or planting trees both to retain stormwater and to reduce air conditioning requirements.

The larger point is not so much that a tremendous amount of technological innovation is occurring overseas, but rather that U.S. policymakers, utilities, and advocates are so slow to wake up to these shifting realities. As stated above, only a very small number of US utilities are adopting asset management approaches to reforming O&M and capital investment programs. Only a few cities, such as Philadelphia, Chicago, Los Angeles, and Seattle have begun to explore urban reuse and stormwater retention systems as a serious alternative to expensive construction of underground stormwater storage tunnels and new water supplies. Few American engineers and academic researchers are attending "leading edge" conferences overseas. And it is the lone voice at EPA that is urging federal policymakers to take note of the dangers of obsolescence in the American water and wastewater sector. Interestingly enough, it is an eminent venture capitalist, John Doerr of Kleiner, Perkins, Caufield, and Byers, who warned last fall that the centralized water/wastewater paradigm of the US was "unsustainable", and his firm is investing heavily in "distributed" water (and energy) technology development overseas. [vii]

A Revitalized Federal Role in Promoting Reform:

Some critics of the current infrastructure think that the deepening crisis of funding will eventually force municipalities and engineers to wake up to the need for fundamental redesign of US infrastructure. But I believe instead that the federal government must reassert a major leadership role if such changes are to occur. As CBO and others have pointed out, there are many reasons why local agencies and utilities will continue to resist innovation.[viii] The risks of using new technologies are seen as high, and local communities can't be asked unilaterally to fund costly projects when the primary benefits of success accrue to the nation at large. Entrenched bureaucracies and professions find it immensely difficult and painful to learn new practices, absorb significant risks, and potentially lose jobs. Fragmented and outdated regulatory structures across the country also destroy incentives for the private sector to invest in research. Fundamental reform of an infrastructure paradigm, requiring so many disparate actors to work together for change, can only occur with federal leadership.

In this context, I would ask your committee to consider the following legislative initiatives, both to support and encourage the work of innovative scientists, engineers, companies, and local utilities across the country, and to insist that recipients of federal funds comply with asset management, integrated water resource planning, and engineering alternatives analysis requirements:

- Authorize $250 million a year for science and technology research and development in water and wastewater infrastructure. This funding would stimulate university and research institutes to rebuild US capacity in water-related science and engineering, and would include funding for basic research in biomimicry and other efforts to redesign fundamental treatment approaches, and for management and socio-economic research. Projects would also be developed in partnership with qualified and interested research organizations such as the Water Environment Research Foundation, the American Water Works Association Research Foundation, the National Association of Homebuilders Research Center, the Electric Power Research Institute, the Water Reuse Foundation, the National Decentralized Water Resources Capacity Development Project, and others;
- Authorize $250 million a year for a national demonstration program in use of innovative technologies and management, including asset management, innovative collection systems, and nonstructural and distributed approaches (decentralized wastewater, Low Impact Development, stormwater retention, water conservation, and others);
- Authorize $1 Billion in grants for innovative and alternative projects proposed by local utilities, including funding for asset management and new technologies. Several steps in the right direction would be to require all designated State and Tribal Assistance Grant projects to be innovative or alternative, and to transition the recent voluntary CWSRF set-asides for zero-interest loans for distributed and nonstructural projects into a mandatory program for the states;
- Require that any applicant for an SRF loan or Trust fund grant have prepared an asset management plan, coordinated with integrated water resource plans in the regional watershed, and examined a full range of engineering alternatives;
- Request the National Academy of Sciences to report to the Congress on long-term issues of sustainability in water and wastewater, new directions and innovation in management and technology internationally, and how such practices can be successfully integrated into US infrastructure over time;
- Request the Environmental Protection Agency to develop a long-range plan for research and development in sustainable water and wastewater infrastructure, including initiatives in basic and applied science, engineering research and development, pilot and bench scale applications, and dissemination strategies;
- Initiate collaboration among Congressional committees having jurisdiction over EPA, USDA, HUD, DOE, Commerce, and other federal agencies with water-related programs, for the purposes of considering alternative means to streamline and integrate sources of funding for research and for federal subsidization of local water resource projects, so as to promote reform and innovation across the country.

None of these proposals are radical. Over the years, various of these programmatic approaches have been included in either 1972 CWA language or in SRF reauthorization language that has not yet been passed by the Congress. Other elements, such as required coordination with regional plans, have been successfully used in ISTEA funding assistance. Finally, one of the earliest and most successful of federal programs has been the support of research, education, and extension in America's land-grant universities. What is unique in these proposals is the level of funding requested to transform the role of the federal government from a minor player in a perpetuation of the status quo into an active agent for change. I urge your Subcommittee's consideration of the importance of that shift and I thank you again for the opportunity to appear before you this morning.

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[i] Congressional Budget Office. 2002. Future Investment in Drinking Water and Wastewater Infrastructure, p. 3-5 and Allbee, Steve. 2005. America's Pathway to Sustainable Water and Wastewater Systems. Water Asset Management International. P. 14

[ii] While estimates of expenditures vary, the 2002 CBO predicted a range of $70-90 Billion a year in combined capital and O&M spending.

[iii] The recent Washington Post series of articles on Finland contains a description of fast-growing wastewater technology firms like Green Rock Oy, which are looking at new markets being created in Europe by stringent new phosphorous regulations, as well as in China. June 1, 2005.

[iv] Allbee, S. op cit. and Byrne, Roger. 2004. What Drove the Change for AAM Improvement in Australia. GHD Asset Management Group. P 14.

[v] These reports include: Technology for a Sustainable Future, Office of Science and Technology Policy, 1994; Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation, EPA, 1991; Industry, Technology, and the Environment: Competitive Challenges and Business Opportunities, Office of Technology Assessment, 1994; Closing the Gap: Innovative Solutions for America's Water Infrastructure, EPA, 2003; as well as the 2002 CBO report.

[vi] Both American Rivers and EPA have been studying these links between sewer diversions and water supply problems.

[vii] John Doerr spoke on the November 16, 2004 Charlie Rose program on PBS. Mr. Doerr cited distributed water and power technologies as the second ranked area of their investments. Tom Friedman in his new book, The World Is Flat, has described Doerr as the legendary figure who had the foresight to invest in Netscape, which widely broadened public access and use of the Internet in the 1990's.

[viii] Nelson, Valerie, 2000. Advanced On-Site Wastewater Treatment and Management Market Study cites many of these barriers.